Responses to Agencies' Comments (September 8, 2017)
"Revised Draft Feasibility Study Technical Memorandum #1: Development and Screening of Remedial Alternatives, Smoky Canyon Mine RI/FS" (March 2017)
November 16, 2017

General Comments

GC-1 It is difficult to follow how the remedial alternatives assembled in Chapter 5 were developed when Table 4-2 lists technologies that were retained but do not appear in Chapter 5. Please add discussions about the technologies listed in Table 4-2 in Chapter 5 to ensure that the technologies that were retained at the end of Chapter 4 move into Chapter 5.

Response: Please see the response to GC-2. It is proposed to include the requested discussion in a revised Section 5.

GC-2 Chapter 5 should be re-organized to analyze the various options by media and technology type against overall effectiveness, implementability and cost. The building of site-wide alternatives to be carried into the detailed analysis will occur in Tech Memo #2. It does not need to occur in Tech Memo #1.

Response: Simplot understands that the agencies would prefer to see a document structure consistent with the Feasibility Study Memorandum #1 for the Ballard Mine. Therefore, consistent with that approach, Simplot proposes to delete the current section 5 and replace it with a brief section describing a final screening of remedial technologies.

Specific Comments

SC-1 **Section 2.2.1, Page 2-9, Vegetation, paragraph 4.** The sentence "Selenium concentrations in vegetation are generally correlated with selenium concentrations in the soil" seems to contradict the justification used to develop plant tissue based PRGs. Please define the term "generally correlated" more clearly.

Response: Additional text will be added to clarify the term "generally correlated", consistent with the analyses and discussion in Appendix A.

SC-2 **Section 2.2.1, Page 2-10, Vegetation, paragraph 1, second sentence.** It is unclear whether plants accumulating selenium at concentrations from 100 to 500 mg/kg were observed in any of the transect locations or in any of the composite samples collected for the RI. Please clarify.

Response: None of the vegetation samples collected at mine panel/overburden disposal area (ODA) transect locations during the RI contained selenium concentrations between 100 and 500 mg/kg. Two vegetation samples collected

at seeps at the Pole Canyon ODA and at Panel E did contain selenium between 100 and 500 mg/kg. These included a forb sample collected downstream from LP-1 (with 153 mg/kg selenium) that contained yellow sweet clover (Melilotus spp.), which is considered a probable selenium accumulator by Guo and Wu (1998)[1], Hambuckers et al. (2008)[2], and Kostopoulou et al. (2010)[3], and a forage sample collected at ES-4 (with 149 mg/kg selenium) that did not contain any selenium hyperaccumulator or accumulator species. The text will be clarified as requested in this comment.

SC-3 **Section 2.2.2, Page 2-11, Alluvial Groundwater, paragraph 1.** The paragraph states that Pole Canyon ODA is the only source that contributes to alluvial groundwater. Although the Pole Canyon ODA is a major contributor, it is not the only contributor. Additional contributors include Panel D dump, Panel A dump, and other sources, such as seeps that are seasonally present, and indirect contributions from recharge of the alluvial groundwater from Sage Creek tributaries impacted by Sage Creek Springs and Hoopes Springs. Please correct this omission.

Response: We believe that the text is correct as stated; however, the discussion of alluvial groundwater will be clarified. Saturated alluvial groundwater systems, where groundwater potential can be mapped and groundwater flow paths can be identified, are present only in the lower portions of Pole Canyon and South Fork Sage Creek and in Sage Valley downgradient of this area. In other areas of the Site the surficial colluvial/alluvial materials are generally unsaturated and do not support saturated groundwater flow and transport.

South Fork Sage Creek springs and Hoopes Spring discharge to surface water in streams and do not serve as a source of recharge to alluvial groundwater at the Site. Seeps on the downgradient sides of the Panel D ODA, Panel A ODA, and others that are seasonally present do not flow into alluvium, but rather

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[1] Guo, X., and L. Wu. 1998. Distribution of free seleno-amino acids in plant tissue of Melilotus indica L. grown in selenium-laden soils. Ecotoxicology and Environmental Safety 39: 207-214.

[2] Hambuckers, A., O. Dotreppe, J. Hornick, L. Istasse, I. Dufrasne. 2008. Soil-applied selenium effects on tissue selenium concentrations in cultivated and adventitious grassland and pasture plant species. Communications in Soil Science and Plant Analysis 39: 800-811.

[3] Kostopoulou, P., N. Barbayiannis, B. Noitsakis. 2010. Water relations of yellow sweetclover under the synergy of drought and selenium addition. Plant Soil 330: 65-71.

percolate through the unsaturated zone into the underlying Wells Formation.

The proposed text revision to the first paragraph of Section 2.2.2 is as follows:

"Saturated alluvial groundwater systems, where groundwater potential can be mapped and groundwater flow paths can be identified, are present only in the lower portions of Pole Canyon and South Fork Sage Creek and in Sage Valley downgradient of this area. In other areas of the Site the surficial colluvial/alluvial materials are generally unsaturated and do not support saturated groundwater flow and transport. Therefore, Pole Canyon ODA is the only source area that contributes water to the alluvial groundwater flow system. Selenium concentrations are highest in shallow groundwater immediately downgradient of the Pole Canyon ODA adjacent to lower Pole Canyon Creek (see GW-15 on Figure 2-1). Selenium concentrations in alluvial groundwater decrease southward from the lower Pole Canyon area toward the north-central portion of Sage Valley, which indicates that attenuation is occurring. ~~The wet meadow, organic-rich environment in Sage Valley is conducive to selenium attenuation.~~"

SC-4 **Section 2.2.2, Page 2-11, Alluvial Groundwater, paragraph 1.** The statement "The wet meadow, organic-rich environment in Sage Valley is conducive to selenium attenuation" implies that absorption of selenium from the [alluvial] groundwater is taking place. Wet meadows are affective for absorption of various contaminants of surface waters but do not reach significantly into vadose zones to treat groundwater. Please remove this statement from this section.

Response: The sentence will be removed as requested.

SC-5 **Section 2.2.3, Page 2-12, Surface Water - Streams, paragraph 3.** This section discusses that the NTCRA has increased the selenium concentrations due to a lower dilution factor. Please provide data on how the NTCRA has decreased the mass loading to lower Pole Canyon Creek and the alluvial groundwater down gradient of the Pole Canyon ODA.

Response: Data and analyses described in the 2016 Pole Canyon NTCRA Annual Report ("2016 Annual Report Pole Canyon NTCRA Effectiveness Monitoring and Performance Evaluation", Formation 2017) will be brought in to the report to describe the reduction of selenium mass loading to lower Pole Canyon Creek and the alluvial groundwater downgradient of the Pole Canyon ODA. The proposed text changes are as follows:

"The 2006 NTCRA isolated the upper Pole Canyon Creek flows from the ODA and has significantly reduced the transport of selenium from the ODA to the environment. The latest monitoring data and evaluation are provided in the Pole Canyon NTCRA 2016

Annual Report (Formation 2017). Since implementation of the NTCRA, water discharging from the toe of the ODA has increased selenium concentrations (from 0.5 to 2 mg/L before the NTCRA to ~~typically ranging from 3~~4 to 6 mg/L after) because less water is available to dilute the infiltrated rainfall and snowmelt than previously. However, the magnitude and duration of flow has decreased substantially and toe seep water, if any, infiltrates to the subsurface close to the toe and generally does not reach lower Pole Canyon Creek downstream from the bypass pipeline discharge. As a result, most of the selenium mass load associated with toe seep flow is now transported to the underlying alluvial groundwater (and potentially the deeper Wells Formation aquifer) rather than directly to surface water that flows into Sage Valley. Selenium concentrations have dropped significantly in lower Pole Canyon Creek (less than 0.001 mg/L at stream sampling location LP-PD) as a result of the NTCRA. An exception to the decreased selenium load occurred during high-flow conditions in 2011 when the bypass pipeline flowed at less than design capacity and the creek flow and water quality briefly reverted to pre-NTCRA conditions. Under the 2013 NTCRA, a Dinwoody/Chert cover was installed on the Pole Canyon ODA for further load reduction by decreasing net percolation resulting from infiltration of incident precipitation and snowmelt.

As described in the 2016 Pole Canyon Annual Report (Formation 2017), the annual selenium load from the Pole Canyon ODA to the environment is calculated by multiplying the annual volume of water leaving the ODA (via the surface water, alluvial groundwater, and bedrock groundwater pathways) by the annual average selenium concentration in surface water or groundwater. The estimated annual flow from the ODA to surface water, alluvial groundwater and Wells Formation groundwater is shown in Table 2-2 (Table 5-3 from the annual report). The water balance model provides estimates for the current condition (i.e., with the NTCRAs) and for a hypothetical scenario where no actions were implemented. As shown in Table 2-2, in 2016 the NTCRAs were estimated to have reduced water flow from the ODA to surface water by 98%; to alluvial groundwater by 55%; and to Wells Formation groundwater by 93%. On a mass basis (combining flow estimates and measured selenium concentrations) the NTCRAs were estimated to have resulted in a reduction in selenium load from the ODA to the environment of 90% in 2016 (91% in surface water, 55% to alluvial groundwater and 93% to Wells Formation groundwater) in 2016 (Table 2-3 [Table 5-4 from the annual report]).

Table 2-2: 2016 Pole Canyon ODA Water-Balance Model Outflow Summary (from Formation 2017)

	Without NTCRA	With NTCRA	Estimated Reduction
Outflow	(acre-feet)	(acre-feet)	(percent)
Surface water discharge to lower Pole Canyon (measured at LP-1)	461	8.1	98%
To alluvial groundwater	65	29	55%
To Wells Formation groundwater	309	22	93%
Total	**836**	**59**	**93%**

Table 2-3: 2016 Pole Canyon ODA Mass-Balance Model Summary (from Formation 2017)

	Without NTCRA	With NTCRA	Estimated Reduction
Annual Selenium Mass Transport			(percent)
Annual average selenium concentration in outflow surface water	1.1 mg/L	5.78 mg/L	---
Annual average selenium concentration in seepage to groundwater	0.45 mg/L	0.45 mg/L	---
To surface water in lower Pole Canyon Creek	1,380 lbs	128 lbs	91%
To alluvial groundwater	79 lbs	35 lbs	55%
To Wells Formation groundwater	376 lbs	27 lbs	93%
Total	**1,840 lbs**	**190 lbs**	**90%**

"

SC-6 Section 2.2.3, Page 2-13, Surface Water - Streams, paragraph 5. The selenium concentrations are stated to be up to 20 times higher than water quality criterion. Please provide supporting data in the report, or a reference to the report

with the source data.

Response: Data referenced in this comment are presented and discussed in the 2015 and 2016 Annual Surface Water and Groundwater Monitoring Reports (Formation 2016[4], 2017[5]). The statement will be revised to clarify that these concentrations are in surface water collected from springs and from creek water just downstream of the springs, the total selenium concentrations will be revised to be from the same year, and the 2016 Annual Report will be cited as a reference.

SC-7 **Section 2.2.3, Page 2-14, Surface Water – Seeps and Detention Basins, paragraph 11.** Please include in the discussion roadway runoff into the sediment/detention basins.

Response: Runoff from roadways is addressed under active mine operations which includes management of runoff and receiving sedimentation/detention basins. Storm water runoff is addressed under the Smoky Canyon Mine Storm Water Pollution Prevention Plan (SWPPP). This will be noted in the revised technical memorandum.

SC-8 **Section 2.2.4, Page 2-15, Stream Sediment, paragraph 2.** Please include in the discussion roadway runoff into the sediment/detention basins.

Response: See response to SC-7.

SC-9 **Section 2.2.5, Page 2-15 & 2-16, Terrestrial and Aquatic Biota.** The numbers presented in the section for copper present a wide range with an unreliable mathematical mean and standard deviation. Please check any outliers and whether these can be reduced as possible errors and dropped from the data set.

Response: Simplot proposes to discuss and resolve the copper question separately from this technical memorandum and, once resolved the FSTM text will be revised accordingly. A memorandum on this issue was submitted by Simplot to the Agencies on September 8, 2017.

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[4] Formation Environmental. 2016. 2015 Annual Surface Water and Groundwater Monitoring Report, Smoky Canyon Mine. Prepared for J.R. Simplot Company. March.

[5] Formation Environmental. 2017. 2016 Annual Surface Water and Groundwater Monitoring Report, Smoky Canyon Mine. Prepared for J.R. Simplot Company. March.

SC-10 **Section 2.2.5, Page 2-15, Terrestrial and Aquatic Biota.** Although the results of the additional 2016 small mammal tissue analysis for copper have not been shared with the Agencies/Tribes yet, this section indicates the elevated copper levels were again found in these organisms. Despite Simplot referring to these as an anomaly, this remains a concern because the levels found in small mammal tissues result in high hazard quotients for carnivores (e.g., raptors). It appears that the elevated copper concentrations from 2010 were confirmed to be high in the recent sampling. Furthermore, other phosphate mines (e.g., Conda Mine) have seen elevated small mammal tissue concentrations, as well. Until evidence suggests otherwise, it should be presumed that the copper concentrations in small mammal tissues at Smoky Canyon Mine could pose a risk to carnivores.

Response: See the response to SC-9.

SC-11 **Section 2.3.0, Page 2-16, Fate and Transport Summary, paragraph 1.** In the first bullet of the section please include an identified pathway from backfilled pits and external ODAs affecting alluvial groundwater.

Response: See Response to SC-3. The RI identified a pathway affecting alluvial groundwater only from Pole Canyon ODA. While there may be some effects from backfilled pits and other external ODAs to small pockets of alluvial groundwater elsewhere, these effects are not significant and, therefore, were not included in the RI Report and in this bullet.

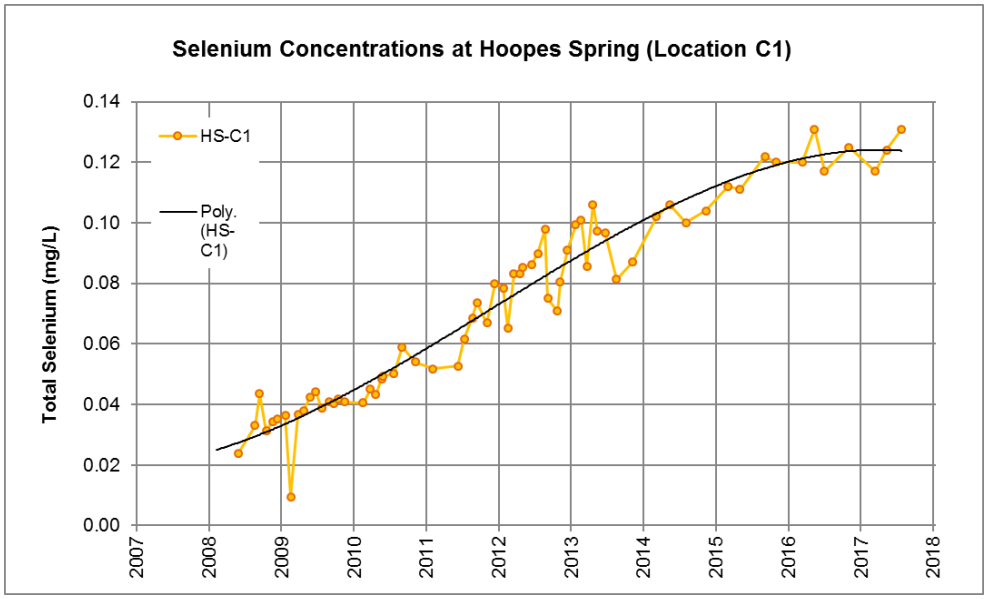
SC-12 **Section 2.4.2, Page 2-19, Migration Routes, Groundwater, paragraph 4.** The text indicates that the modeling estimates that the selenium load at the spring's complex will peak in 2015/2016. It is currently 2017. How do measured concentrations compare to the predicted concentrations?

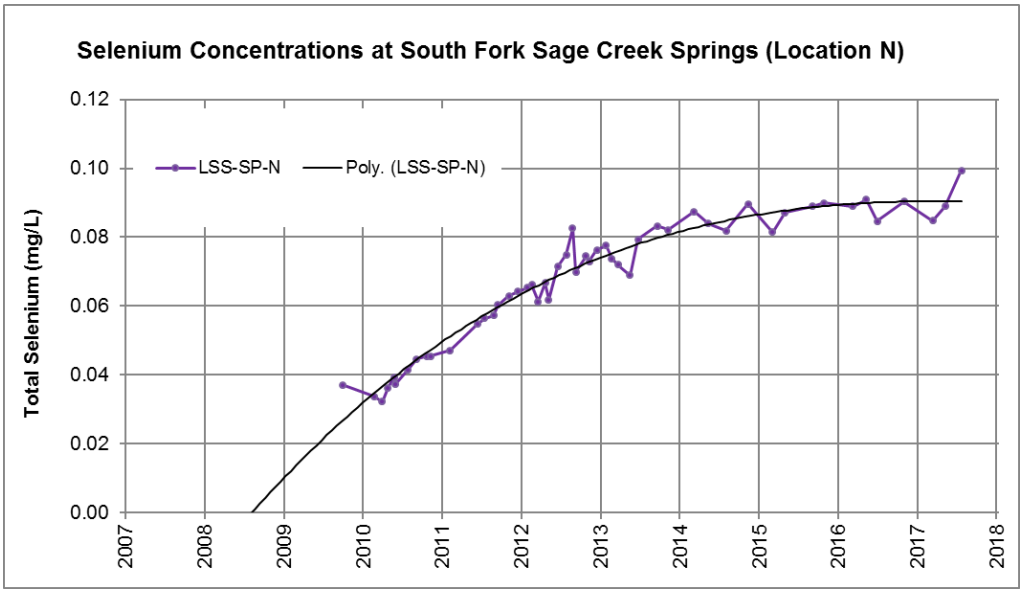
Response: The selenium concentrations are shown on the figures below, along with a polynomial regression line. As shown, it appears that concentrations are in their peak range at both Hoopes Spring and South Fork Sage Creek Springs. Concentrations are in the range predicted by the RI model:

- HS-3 predicted peak concentration 0.09 mg/L (the average of the last 4 measurements is 0.098 mg/L);
- LSS predicted peak concentration 0.02 mg/L (the average of the last 4 measurements is 0.019 mg/L).

The RI model will be recalibrated as part of the FS detailed analysis, including

any adjustments to account for the most recent data.





SC-13 Section 2.4.3, page 2-22, Exposure Pathways. Please specify exposure pathways (e.g. ingestion of fish, ingestion of benthic invertebrates, etc.) rather than state 'Ingestion (food web uptake)' within the list of 'Potentially complete significant exposure pathways for riparian and aquatic receptors…'

Response: The discussion of exposure pathways will be clarified as requested.

SC-14 **Section 2.5.2, Page 2-24, Ecological Receptors, paragraph 1.** The section indicates that selenium is the only primary risk driver for aquatic and terrestrial biota. The previous sections indicate that arsenic and copper (secondary) are other COCs for the site. Please include the other COCs that are present.

Response: The previous sections discuss risk to human receptors and results of sampling for the various site media including aquatic and terrestrial biota. Whereas selenium and arsenic were the primary risk drivers for human receptors, selenium was the primary risk driver for aquatic and terrestrial biota. Copper was discussed in the Nature and Extent of contamination section due to the elevated concentrations in small mammal tissue samples, although copper was not identified as a primary risk driver at the Site. However, in the subsequent discussion also in Section 2.5.2, copper and several other chemicals were identified as ecological COCs (ECOCs) for aquatics and terrestrial biota. In the context of these discussions, other ECOCs are identified and, therefore, no change is needed to address this comment. Please see the response to SC-9 regarding the copper issue.

SC-15 **Section 2.5.2, page 2-25, paragraph 3, second sentence.** State the organism or class of organism(s) upon which the TRVs for selenium in sediments are based.

Response: As stated in the SSERA Report (Section 3.3.2.2), the sediment TRVs for selenium are not based on effects to benthic organisms, but rather as potential bioaccumulation effects to organisms that consume those benthic organisms. This information will be added to the text as requested.

SC-16 **Section 2.5.2, Page 2-25, Ecological Receptors, paragraph 1&2.** Please include the reference to the studies that provide information to this section.

Response: The reference(s) will be added as requested.

SC-17 **Section 2.5.2, page 2-26, Ecological Receptors, paragraph 4.** The sentence "While no detailed population studies were conducted in those areas, small mammal sampling was successful in both 2010 and 2016 suggesting the presence of a functioning small mammal community" is not supportable. The small mammals sampling for tissue analysis only indicates that these mammals are present. It provides very little evidence to suggest a "functioning small mammal community." Other information (e.g., % of each sex, % of age classes present, recruitment through immigration rather than in-situ reproduction, etc.) obtained during population studies are necessary to support that statement. This

sentence along with the subsequent sentence should be revised or removed.

Response: While limited, the small mammal data at the Site do suggest the presence of a functioning small mammal community. While not specifically the goal of the sampling, the data do provide information such as sex ratios and age class distribution. This information will be provided in the revised document and a reference to the appropriate Data Summary Report will be added to the text.

SC-18 Section 3.1, Page 3-1, Environmental Conditions of Concern, first bullet. There appears to be a transposition error, currently reads '…sources to the springs in 2050….." probably should be 2005.

Response: The text is correct and is based on predictive groundwater modeling presented in the RI Report (Formation 2014). Further explanation will be added to the text to clarify the environmental conditions of concern in the first bullet.

SC-19 Section 3.3, Page 3-7, Remedial Action Objectives: Replace the second sentence with: "Remedial Action Objectives provide a general description of what the cleanup will accomplish (e.g., restoration of ground water)." (This is a direct quote from EPA guidance.) Delete the third sentence – acceptable risks are those within the risk range of 10^{-6} to 10^{-4}.

Response: The CERCLA guidance (EPA, 1998) describes development of RAOs as follows (Section 4.1.2.1, first bullet):

"Develop remedial action objectives specifying the contaminants and media of interest, exposure pathways, and preliminary remediation goals that permit a range of treatment and containment alternatives to be developed."

Therefore, we believe the sentence is consistent with guidance (note that we have elected to develop the Preliminary Remediation Goals immediately following the RAO section, which is common practice).

The third sentence will be deleted as requested.

SC-20 Section 3.3, Page 3-7, Ground Water. Please delete the first bullet as exposure prevention is not an appropriate RAO in and of itself.

Response: The following is taken from Section 4.2.1 of the CERCLA guidance:

"Remedial action objectives aimed at protecting human health and the environment should specify:

- The contaminant(s) of concern
- Exposure route(s) and receptor(s)
- An acceptable contaminant level or range of levels for each exposure route (i.e., a preliminary remediation goal)

Remedial action objectives for protecting human receptors should express both a contaminant level and an exposure route, rather than contaminant levels alone, because protectiveness may be achieved by reducing exposure (such as capping an area, limiting access, or providing an alternate water supply) as well as by reducing contaminant levels [emphasis added]. Because remedial action objectives for protecting environmental receptors typically seek to preserve or restore a resource (e.g., as ground water), environmental objective(s) should be expressed in terms of the medium of interest and target cleanup levels, whenever possible."

The associated Table 4.1 in the guidance provides example RAOs which include both reduction of contaminant levels and prevention of exposure. Because all RAOs must be met, this approach provides overall protection of human health and the environment. Therefore, we believe that the RAO is appropriate.

SC-21 **Section 3.3, Page 3-7, Soils, Overburden and Vegetation and Surface Water RAOs.** There are several RAOs that focus on eliminating or reducing risks. Please re-write these to be more straightforward to address the contamination that is causing the unacceptable risks, such as in the second bullet under surface water that begins "Reduce selenium concentrations in lower Sage Creek…"

Response: Please see the response to SC-20. We believe that the range of the RAOs is appropriate for the Site and defines the goals to meet the threshold criteria of overall protection of human health and the environment and attainment of ARARs. The form of several of the RAOs were prescribed by the agencies as part of the Environmental Evaluation/Cost Evaluation for the Pole Canyon ODA cover. If the agencies have specific suggestions, Simplot would be happy to discuss them.

SC-22 **Section 3.3, Page 3-7, Surface Water, third bullet.** Please cite the source of the 'Aquatic Water Quality Standard'.

Response: The source will be cited as IDAPA 58.01.02 – Water Quality Standards.

SC-23 Section 3.4, Page 3-8, Preliminary Remediation Goals, Regulated Surface Water, paragraph 2, seventh sentence. Replace "When" with "If".

Response: The proposed rule making process has advanced considerably since the previous draft FSTM#1 was submitted. It is proposed to replace the subsection with the following:

"Regulated Surface Water: Idaho Water Quality Standard for Selenium

Elevated selenium concentrations in Hoopes Spring, lower Sage Creek, and lower Crow Creek pose unacceptable risks for aquatic life. The aquatic water quality standard of 5 µg/L is applicable for surface water and applies to all locations within the watershed. In recent years, the national surface water quality criterion for selenium has been undergoing extensive revision (e.g., 2014 Draft Peer Review document, 2015 Draft Aquatic Life Criterion release, and the 2016 Final Aquatic Life Criterion release). The selenium aquatic life criterion will differ from most criteria derivation processes because it is based on effects relative to tissue concentrations in fish due to exposure through diet.

The State of Idaho is in the rulemaking process to update the selenium criteria for aquatic life use. The proposed rule replaces the existing water column-based criteria for selenium with a four-part criterion. The recommended elements are (1) a fish egg-ovary element, (2) a fish whole-body and/or muscle element, (3) a water column element which includes one value for lentic (still water) and one value for lotic (running water) aquatic systems, and (4) a water column intermittent element to account for potential chronic effects from short-term exposures (one value for lentic and one value for lotic aquatic systems).

The proposed rule also includes the addition of Section 287, Site-Specific Aquatic Life Criteria for Selenium. Subsections 287.01 through 287.04 were negotiated in response to proposals for site-specific selenium criteria submitted by Nu-West Industries, Inc., and J.R. Simplot Company. Subsections 287.03 and 287.04 set out the site-specific selenium criteria for Hoopes Spring, Sage Creek, and Crow Creek near the Smoky Canyon Mine.

If the final rule is adopted by the State of Idaho, it will supersede the current 5 µg/L standard for lower Sage Creek and lower Crow Creek to the Wyoming border. This is currently expected to occur in 2018."

SC-24 Section 3.4, Page 3-8, Preliminary Remediation Goals, Regulated Surface Water, paragraph 2, eighth sentence. Replace "until" with "unless".

Response: Please see the response to SC-23.

SC-25 **Section 3.4, Page 3-8, Preliminary Remediation Goals, Ground Water, last sentence.** Please delete the last sentence, as per the preamble to the National Contingency Plan, the area of attainment/point of compliance for achieving groundwater cleanup levels is generally expected to be throughout the plume or, where there is a waste management area, at the edge of the waste management area.

Response: The last sentence will be deleted as requested.

SC-26 **Section 3.4, Page 3-10, Soils, Over Burden, and Vegetation, first bullet.** Please reconcile a proposed vegetation site-wide PRG selenium average concentration of 10 mg/kg versus the IDEQ Area-Wide Risk Management Plan (AWRMP, IDEQ 2004) selenium concentration of 5 mg/kg. Explain how the analysis in Appendix A accounts for risk to receptors exposed to vegetation with concentrations less than 10 mg/kg.

Response: As noted in the executive summary of IDEQ's Risk Management Plan (RPM):

"The RMP was developed as a discretionary guidance document to assist Lead and Support Agency representatives with their mine-specific risk management decision-making responsibilities regarding historic mining operation releases and associated impacts from selenium and related trace metals in the Southeast Idaho Phosphate Mining Resource Area…. In accordance with the AWI scope of work, the plan is advisory in nature; all mine specific risk management decision-making is at the discretion of the assigned Lead Agency, with consultation from the designated Support Agency representatives, according to site-specific goals, needs and conditions, and appropriate regulatory considerations."

The RMP was part of an area-wide Non-Time-Critical Removal Action (NTCRA) approach that was subsequently terminated by the regulatory agencies in favor of full Site-specific Remedial Investigation/Feasibility Study at each mine. At each Site (including Smoky Canyon) this results in Site-specific risk assessments that (along with ARARs) provide the basis for the remedial action scope. Per CERCLA guidance, the RMP is identified as To Be Considered information in the document.

The analysis in Appendix A calculates risk to all receptors based on an average selenium concentration in vegetation of 10 mg/kg. Because vegetation selenium concentrations are used to estimate selenium concentrations in the other primary exposure media for the ecological receptors (i.e. invertebrates and small

mammals), it can be inferred that exposure based on a vegetation concentration of less than 10 mg/kg would result in lower risk.

SC-27 **Section 3.4, Page 3-10, Soils, Over Burden, and Vegetation, first and third bullets.** The term "average" needs to be further clarified. It is assumed that a chronic PRG would need to be compared with a 95% UCL of the mean rather than a true mean. This would consistent with Simplot's previous response to GC#2 and SC#44 on the Draft Feasibility Study Technical Memorandum 1, which states a UCL would be compared with the PRG. Please revise the text to indicate that an upper estimate of the average (e.g., 95% UCL of the mean) will be compared to the PRG.

Response: The text will be revised as requested.

SC-28 **Section 3.4, Page 3-10, Soils, Over Burden, and Vegetation, paragraph 1 of the sub-section.** The paragraph indicates that risks to deer, elk, coyotes, and raptors are relatively low for selenium exposure. In the Site-Specific Ecological Risk Assessment, the risks for the coyote and raptors (northern harrier) are elevated based on their diet of smaller mammals and being a third degree, or third tier, consumers with a HQ>1. Table 2-19 lists selenium as an ECOPC for deer (mule deer), coyote, and raptor (northern harrier). Please revise this section to account for the information from this assessment.

Response: The text will be revised to match the conclusions from the SSERA.

SC-29 **Section 3.4, Page 3-11, Soils, Over Burden, and Vegetation, paragraph 1.** It is indicated that the background arsenic concentration in soils of 11.5 mg/kg is from MWH 2015 and is as presented in the Smoky SSHHRA. The value does appear in the SSHHRA, however no reference could be found for it. It appears to represent the 95% USL from MWH 2015 P4 Mines background report, however this is not the value selected for use at P4. Instead, the 95-95 UTL from that report was selected as an upper end of the range of background to be used as a not to exceed value. It is not appropriate to compare estimates of means with upper estimates of the range of background. Therefore, use the 95% USL of background.

Response: The text will be revised to clarify that the background arsenic concentration in soils, estimated at 11.5 mg/kg in MWH (2015) as the 95% upper simultaneous limit (95USL) for pooled values (all background samples combined), is used as the PRG at Smoky Canyon.

SC-30 **Section 3.4, Page 3-11, Soils, Over Burden, and Vegetation paragraph 1, last sentence.** Again, this text, "… mean arsenic concentrations for the Site-wide concentration has been established" is inconsistent with the Agencies understanding that an upper confidence limit on the mean would be used. It is also not consistent with Simplot's previous response to GC#2 and SC#44 on the Draft Feasibility Study Technical Memorandum 1, which state a "site-wide UCL concentration is proposed" and "average selenium concentrations (e.g., as UCL95)," respectively. Please revise the text to indicate that an upper estimate of the average (e.g., 95% UCL of the mean) will be compared to the PRG.

Response: The text will be revised as requested.

SC-31 **Section 4.1, Page 4-1, Contaminants and Affected Media, paragraph 1, first sentence.** Please include arsenic as a primary contaminant of interest in solid media, as there is an RAO that has been developed to address arsenic.

Response: The following text addition is proposed at the end of the first paragraph:

"Arsenic is also a primary contaminant of interest in solid media because of potentially unacceptable risks to future Seasonal Ranchers due to ingestion of beef."

SC-32 **Section 4.4.2, Page 4-8, Institutional Controls, paragraph 3, first sentence.** Delete forest closure orders and grazing controls from this sentence, as those controls are not enforced by a state or local government on the Forest.

Response: The text will be revised as requested.

SC-33 **Section 4.4.4.1, Page 4-11, Engineered Covers, paragraph 2.** In the middle of the paragraph, please indicate an additional requirement of the cover is to be resistant to animal activity.

Response: The text will be revised as requested.

SC-34 **Section 4.4.6.4, Page 4-21, Ground Water / Surface Water Disposal, Injection, first sentence.** Please replace "impacted" with "treated". Impacted ground water that exceed MCLs will not be injected unless it is first treated to meet MCLs.

Response: The text will be revised as requested.

SC-35 **Section 4.5.3, Page 4-33, Access Controls, paragraph 1, last sentence.** Please delete this sentence as the BMP and source cited is for active and future

mining.

Response: The text will be revised as requested.

SC-36 **Section 4.5.7, Page 4-38, Treatment, paragraph 2.** Use of the term "reverse osmosis/ultrafiltration" is inconsistent. If it is the same process as ultrafiltration/reverse osmosis, please keep the term consistent throughout the document. Since filtration occurs before the reverse osmosis process, please use ultrafiltration/reverse osmosis unless you are referring to a reverse order procedure.

Response: The document will be modified to consistently use the term "ultrafiltration/reverse osmosis".

SC-37 **Section 4.5.7, Page 4-38, Treatment, paragraph 3.** Solvent extraction is not retained for development of remedial alternatives, without an explanation. The other methods which are not retained have an explanation. Please explain why it is not retained.

Response: The screening step was performed in Section 4.4.7.1. The following text is proposed to provide consistency with the FSTM for the Ballard Mine Site (the text is taken from Table 4-6 of that document):

"Solvent Extraction – Solvent extraction is the separation of constituents from a liquid by contact with another, immiscible, liquid. Solvent extraction is effective on organic constituents, but is not proven to be an effective treatment method for selenium. Therefore, solvent extraction is not a viable technology and is eliminated from further screening."

SC-38 **Section 5.1, Page 5-1, Description of Remedial Alternatives, paragraph 2.** It is unclear why Panel E is not considered in the alternatives. Panel E is covered by the RI/FS settlement agreement. At a minimum, it should be considered as part of No Further Action.

Response: As discussed in the response to GC-2, it is proposed to delete the current Section 5 and therefore the text associated with SC-38 through -45 will no longer be in the document. Responses are provided and the comments will be addressed in the detailed analysis in FSTM#2.

The settlement agreement defines the Site as "the Smoky Canyon Mine, which includes the areas of overburden disposal associated with the mine." This does not include areas of active mining and therefore includes panels A, C, D, E and

the Pole Canyon ODA. Areas not proposed for additional remedial action (i.e., Panel C and Panel E) will be included in the No Further Action alternative.

SC-39 **Section 5.1.2, Page 5-2, Alternative 2, Barrier Covers, paragraph 2.** As the Agencies have not yet supported a PRG of 50 mg/kg selenium in vegetation, this paragraph may need to be revised to discuss whether the cover in the Conda Mine study would be effective to meet a lower PRG.

Response: Comment noted. Please see the response to SC-16 on Appendix A.

SC-40 **Section 5.1.2, Page 5-3, Alternatives 2, Barrier Covers, paragraph 4.** The term "easy" is used to describe going from 2000 gpm to 3000 gpm treatment of contaminated water. While it is a developed and implementable technology, "easy" might be an understatement of the additional complexity and cost to upscale the pilot plant from 2000 to 3000 gpm. Please change the term "easy" to reflect this.

Response: Comment noted. Additional explanation will be provided in the detailed analysis.

SC-41 **Section 5.1.2, Page 5-2 Alternative 2, Barrier Covers, paragraph 4.** This discussion did not address the original comment and still does not explain the rationale between treatment of 2000 gpm and 3000 gpm.

Response: Additional explanation will be provided in the detailed analysis.

SC-42 **Section 5.1.2, Page 5-3 Alternative 2, Barrier Covers, paragraph 3.** There does not appear to be discussion to support the addition of another FBR unit.

Response: Additional explanation will be provided in the detailed analysis.

SC-43 **Section 5.2.2.1, Page 5-6, Effectiveness, paragraph 1.** As the Agencies have not yet supported a PRG of 50 mg/kg selenium in vegetation, this paragraph may need to be revised to discuss whether the cover in the Conda Mine study would be effective to meet a lower PRG.

Response: Comment noted. Please see the response to SC-16 on Appendix A. The results of the Field Scale Pilot Study at Conda will be considered in the detailed analysis, as appropriate.

SC-44 **Section 5.2.2.1, Page 5-8, Effectiveness, paragraph 3.** The last sentence regarding the volume of water released from Hoopes Springs does not make sense as written. Please revise.

Response: Comment noted. It will be clarified in the detailed analysis.

Appendix A

General Comments:

GC-1 The report needs further discussion of the technical basis and verification of model assumptions used in developing the Preliminary Remediation Goals for soil and vegetation. For instance, the footnotes for Tables 2 and 12 indicates that several results were excluded from analysis based on an outlier determination. The text needs to include a discussion of how outliers were identified and the rationale that was used for their removal from subsequent analysis. The report also should provide a discussion of how the underlying statistical assumptions associated with the regression analysis were evaluated. Fitting the model is only the first step in a regression analysis. Once the regression model has been developed, the statistical assumptions underlying the approach should be evaluated to ensure confidence in the inferences drawn on the model.

Response: As requested, a more detailed discussion of the statistical analysis will be provided in the revised Appendix A.

GC-2 The report includes almost 600 pages of attachments that are primarily associated with the regression analysis. However, the information provided in these attachments are not summarized in the text of the report. A large portion of the attachments appears to be extraneous material that could be either removed from the report or at a minimum, condensed into a format that provides the appropriate level of documentation.

Response: The report provides the output from the statistics program, which was included to provide all available information on the statistical tests run. The attachment will be moved to a CD for convenience.

GC-3 Individual arguments for using geometric mean of NOAELs for the TRV instead of LOAEL, not including soil ingestion due to its low contribution of 1-3 percent of the overall risk, and using a PRG that would result in HQs greater than 1 for some representative endpoint species could be made. However, collectively,

these may result in a remedy that is under-protective. Considering this, the Agencies believe the site data for comparison with PRGs needs to be based on a 95% UCL of the mean to assure protectiveness of any remedy.

Response: The 95% UCL of the mean will be used, as requested.

GC-4 Further explanation of the soil and vegetation sampling approach producing an appropriate comprehensive data set for use correlating the two media is needed. A review of the current Conda Field-Scale Pilot Study (FSPS), which has undergone extensive sampling, would provide further information on the vertical extent variability with vegetation at these mine sites. Due to this variability, it is not unlikely to see the range observed between the co-located shallow soil and vegetation samples.

Response: The soil data were collected from 100' x 100' sampling sites in the RI. Soils were collected from 4 locations within each site and the vegetation sample was collected as a composite of the dominant vegetation from within each site. The data were collected under the approved RI/FS Work Plan and Sampling and Analysis Plan, and the sampling effort was designed to provide an estimate of the average soil COPC concentrations as well as the average concentrations of vegetation COPCs from the same locations. This information will be added to the revised document. In addition, the data from the Conda FSPS will be reviewed for potential use at Smoky and will be included and discussed in the revised document, as appropriate based on the applicability of the data.

However, please note that the lack of correlation between selenium concentrations in soil and vegetation is a significant part of the rationale for recommending a PRG based on vegetation. The lack of predictive power means that soil concentration data cannot be used as a reliable surrogate for predicting exposure to herbivores grazing or browsing at the Site, or for omnivores/carnivores that eat prey that has fed on vegetation. The source of the variability in the soil-vegetation relationship is not known. As suggested in the comment, it could include the extent to which soil samples represented the entire rooting zone for plants, and numerous other factors are likely involved.

Surface soil sampling was conducted per the approved in the work plan for the RI and Risk Assessments. A primary purpose of the surface sampling for the risk assessment was to estimate exposure to humans, ecological receptors, and livestock from incidental ingestion of soils. Establishing a causal relationship between soil chemical concentration and vegetation uptake and content was not

a primary goal for the RI field sampling.

On the other hand, vegetation is well correlated with selenium concentrations in invertebrates and small mammals from the ODAs. So, vegetation selenium concentration is a good indicator for exposure to herbivores, and omnivore/carnivores that feed onsite. Since vegetation is relatively stationary, it can provide a good spatial metric for evaluating the effectiveness of remedial alternatives. If a soil-based PRG is to be used, the first step in PRG calculation would be to estimate vegetation selenium concentrations using the soil data which is a highly uncertain measurement based on the available data.

GC-5 A scatter plot using the soil and vegetation data is attached - see Attachment 1. The soil vs vegetation scatter plot suggests that soil is composed of two different populations while the vegetation is a single population. Also, a significant fraction of the soil samples exhibit relatively low concentrations, much more than for the other media. Soil samples with low concentrations of selenium appear to be mainly associated with the EPL samples. This might affect the correlation. Please review this information and clarify.

Response: A more detailed statistical analysis will be provided in the revised Appendix A which evaluate the information provided in the comment.

GC-6 There appears to be confusion between a preliminary remediation goal (PRG) and a threshold effect. Threshold effect values are expressed as pathway concentration units (e.g., concentration of selenium in vegetation for the protection of livestock). PRGs are concentrations used during remediation and monitoring (see specific comment #16).

Response: Simplot requests clarification on the distinction that the commenter is making.

Based on EPA guidance, PRGs are based on both site-specific health protective criteria developed based on site-specific information and ARARs (EPA 1991). Development of a PRG for selenium is intended to be protective of human health and the environment (e.g., ecological receptors and livestock). Consistent with guidance, the PRG for vegetation is based on information from scientific literature and EPA guidance regarding health-protective levels (including thresholds), and considers Site-specific conditions such as potential background. PRGs will be used in the FS (and risk management in general) to assess effectiveness of remedial alternatives.

GC-7 Selection of PRGs depends upon several factors, including remedial action objectives and current and future land uses, and they have to be consistent with relevant and appropriate requirements (ARARs). The proposed PRGs may not be consistent with potential ARARs (see specific comment #17).

Response: See response to specific comment #17.

GC-8 The rationale provided to only include reclaimed and un-reclaimed mining areas seems to contradict the outcomes of the ecological risk assessment where the nature and extent of the contamination was determined beyond the reclaimed and un-reclaimed locations. The ecological risk assessment shows elevated selenium concentrations at some seeps and riparian locations, which were not included in the analysis (see specific comment #5).

Response: The SSERA does show HQs greater than 1 at seeps and riparian locations. However, those locations should be handled separately from the ODAs because the risk estimates at these locations include exposure to selenium in seep water, shallow groundwater or interflow. This exposure pathway for the vegetation is different on the ODAs due to exposure of plant roots to soil or ODA materials, and likely associated with a different efficiency of uptake. Remedial actions will address risks at seeps and riparian locations.

GC-9 The document lacks a key step for the derivation of PRGs, which is the comparison of soil- derived PRG (137 mg/kg) to site-specific background values. Although regional and background soil values are available, the currently available site-specific information prevents accurate predictions of population-level effects, as acknowledged in the ecological risk assessment.

Response: Comment noted. A comparison of the PRG to background will be included in the revised Appendix A.

Specific Comments:

SC-1 **List of Acronyms, page iii.** "SUP" needs to be revised to "SUF" for site use factor.

Response: The typographical error will be corrected.

SC-2 **Section 1, Page 1, Introduction, paragraph 4.** Clarify the methodology used to determine the based chronic PRG of 10 mg/kg.

Response: The proposed 10 mg/kg vegetation PRG is a selenium concentration in vegetation that can be shown to be protective of ecological receptor populations inhabiting the ODAs at the Site. The expected protectiveness of that value is the focus of the data presented in Appendix A.

SC-3 **Section 1, Page 1, Introduction, paragraph 4.** Although a plant tissue based chronic PRG of 10 mg/kg has not been ruled out, it would be beneficial for the risk managers to understand what the plant tissue PRG would be for each receptor based on a HQ equal to 1 and using appropriate SUFs. In addition to the HQs results already provided using a plant tissue PRG of 10, please add a table that provides the plant tissue concentration that would result in an HQ of 1 for each of the ecological receptors.

Response: The requested table will be provided in the revised Appendix A.

SC-4 **Section 2, Page 3, Site-Specific Ecological Risk Assessment Summary, paragraph 3.** This paragraph discusses the elevated copper risks for carnivores that was found at Simplot's Smoky Canyon Mine and Conda Mine. This continues to be described as anomalous although little evidence has been provided to support this assertion. Additional small mammal tissue sampling has apparently occurred in 2016, however the results have not been shared. Prior to accepting that additional PRGs are not necessary for copper, the Agencies need to review the results of the supplemental small mammal study. This information needs to be included in the FS or copper PRGs need to be provided.

Response: A memorandum on this issue was submitted by Simplot to the Agencies on September 8, 2017. Once this issue is resolved, the outcome will be included in the revised FSTM#1.

SC-5 **Section 3.1, Page 5, Site-Specific Data, paragraph 3.** Findings from the ecological risk assessment show high hazard quotients for specific ecological receptors at seeps DS-7 (east of Panel D) and ES-4 (east of Panel E) as well as riparian location LP-PD (Pole Canyon). These sampling sites were not included in the data analysis. Similarly, areas with low concentrations of selenium (North Sage) were not included in the data analysis. The document lacks comparisons to background vegetation values, which is crucial in the PRG derivation process.

Response: Please see the response to GC-8 regarding seeps and riparian areas. The HQs calculated in northern Sage Valley are discussed in Section 4.4

of Appendix A and are used as a comparison point for the HQs calculated on the ODAs at the proposed 10 mg/kg PRG. This discussion will be expanded.

SC-6 **Section 3.2, Page 6, Relationship Between Soil and Tissue Selenium.** This section describes that collocated soil samples were collected with vegetation samples. It should be recognized that it may be difficult to evaluate the relationship from soil to plants if the soil samples do not include soils from the entire profile containing the roots system. This is particularly true of panels that have some cover material at the surface. This is a variable that needs to be considered when looking at the relationship between soil and vegetation concentrations and could be the reason that a better R^2 is not found between soil and plant tissue. Unless soil concentrations are consistent with depth, it would be difficult to correlate concentrations from a 0 to 12 inch soil depth interval with concentrations detected in vegetation. The PRG appendix needs to describe to what extent, if possible, the relationship from soil to plant tissue is affected by not sampling the entire soil depth interval containing the root system.

Response: Additional discussion of the soil and vegetation relationship will be added to the revised technical memorandum. The overburden is run-of-mine and, as such is highly heterogeneous on a relatively small scale (both in terms of selenium concentrations and material properties, such as carbon content, texture, and structure). There is no evidence that there are selenium concentration gradients with depth in the ODAs, and in fact, due to the mining and dumping method, concentrations are expected to be relatively constant with depth (on an ODA-scale).

Further, it is important to note that the comment clearly highlights the rationale for Simplot's request to utilize a vegetation-based PRG versus a soil-based PRG. The data indicate a lack of relationship between the collocated soil and vegetation selenium measurements. The key relationship between selenium in run-of-mine material and ecological risk is from the direct exposure pathways (i.e. food ingestion). Vegetation concentrations can be used to reliably predict other prey tissue concentrations and subsequently exposure to wildlife receptors. Therefore, with a PRG based on vegetation, the difficulties in describing the relationship between selenium in soils and vegetation are moot. If a soil-based PRG is used, the first step in PRG calculation is to estimate vegetation selenium concentrations using the soil data which is a highly uncertain estimate based on the available data. Eliminating that estimation step by using a vegetation-based PRG greatly reduces the uncertainty in estimating exposure and risk in the risk management step for the Site.

SC-7 **Section 3.2, Page 6, Relationship Between Soil and Tissue Selenium.** Simplot has other information available that may be useful in evaluating the relationship between soil and plant tissue concentrations. Perhaps the relationship is poor because of differences in vegetation types (particularly the presence of some accumulator species) between sample locations. Are data available to evaluate the R^2 based on grasses and forbs separately? Also, the Field Scale Pilot Study plots at Simplot's Conda Mine may provide useful information with regards to the relationship between soil and plant tissue concentrations since these have soil depth intervals sampled at greater depths and with more controlled vegetation types. It is recommended that Simplot evaluate whether this information could be used to better understand soil to plant tissue relationship.

Response: Please see the responses to GC-4 and SC-6.

SC-8 **Section 3.2, Page 6, Relationship Between Soil and Tissue Selenium, paragraph 1.** Linear regression as a parametric statistical technique makes a number of underlying assumptions. Among the most important of these are that the regression residuals are approximately normal in distribution, have equal variances, are statistically independent, and the dependent variable is linearly related to the independent variable. Provide information on how these assumptions were verified?

Response: As requested, a more detailed statistical analysis will be provided in the revised Appendix A.

SC-9 **Section 3.2, Page 6, Relationship Between Soil and Tissue Selenium, paragraph 2.** The text refers to p-values for the correlation analysis. Please include the p-values in Table 2.

Response: The p-values will be added to Table 2 as requested.

SC-10 **Section 3.2, Page 6, Relationship Between Soil and Tissue Selenium, paragraph 2.** Please clarify whether the R-squared values discussed in the text were calculated after the removal of outliers. If this is the case, please provide rationale on the approach that was used to identify and remove the suspected data point(s).

Response: As requested, a more detailed description of the statistical analysis will be provided in the revised Appendix A. The R-squared values discussed in the text were calculated after the removal of outliers.

SC-11 **Section 3.2, Page 6, Relationship Between Soil and Tissue Selenium, paragraph 2.** The R-squared is listed as 0.47 for the correlation between soil and small mammals using natural log transformed data. The value provided in Attachment 3 (ln Transformation – APL 10 Excluded) is 0.35. Please verify the R-squared values provided in Table 2.

Response: The 0.47 listed in Table 2 is a typographical error and will be replaced with the correct value (0.35) as shown in the attachment.

SC-12 **Section 3.2, Page 6, Relationship Between Soil and Tissue Selenium, paragraph 3.** The data used for the vegetation analysis included a wide variety of plants present at the site (grass, forbs, woody). These plants are representative of the flora observed during the field sampling event; however, it is important to consider several aspects of the variability of selenium uptake and concentration in these plants. For example, grasses, collected mainly from Pole Canyon ODA, are generally non-selenium accumulators (they can accumulate less than 100 mg Se/kg dw). On the other hand, forbs such as Medicago sativa, collected from Panel D, are known as secondary selenium accumulators and can accumulate up to 100 mg Se/kg dw.[6] Therefore, the inconsistencies mentioned on page 6 (section 3.2) are most likely due to interpretation of sampling results of vegetation samples and collocated soil samples. Other factors that contribute to selenium uptake in plants include season, rainfall, and type of soil.

Response: The comment is correct and highlights why the forage samples were used for the calculations because they represent the mix of species available. The comment also highlights the utility of using a vegetation-based PRG because there is no need to establish a strong relationship between the soil and the vegetation concentrations. An expanded description of the statistical evaluation will be provided in the revised technical memorandum that also discusses the potential correlations between selenium concentrations in soil samples and in collocated grass and forage samples.

SC-13 **Section 4, Page 8, Vegetation-Based PRG for Selenium, paragraph 1.** This section (and others) states that "The 10 mg/kg PRG is based on Site-wide average selenium concentrations in vegetation …" The term "average" needs to be further clarified. It is assumed that a chronic PRG would need to be compared with a 95% UCL of the mean rather than a true mean. This would consistent with Simplot's response to GC#2 on the Feasibility Study Technical Memo 1, which

[6] Gupta and Gupta. 2016. "An Overview of Selenium Uptake, Metabolism and Toxicity in Plants." *Frontiers in Plant Research* 7:1–14.

states a UCL would be compared with the PRG. Revise the text to indicate that an upper estimate of the average (e.g., 95% UCL of the mean) will be compared to the PRG.

Response: The requested change will be made.

SC-14 **Section 4.0, Page 8, Vegetation-Based PRG for Selenium, paragraph 1.** The relevance and protectiveness of the 10 mg/kg chronic PRG is questionable for the following reasons:

- The rationale for using average instead of other more conservative metrics, such us the 95% upper confidence limit, is not provided. Concentrations of selenium in vegetation varied widely ranging from 0.03 mg/kg in Panel A Area 1 to 50.1 mg/kg in Panel A Area 2 (Table 1).

Response: See response to comment SC-13.

- Vegetation selenium concentrations used for the calculations only represent summer conditions. Spring and fall are also critical when evaluating plant uptake of selenium.

Response: Data were collected as part of the RI to assess temporal variability in vegetation selenium concentrations. The RI data collected for June versus August were inconclusive relative to whether there was a change in average concentrations in alfalfa. While this question is potentially important for determining the effectiveness of the implementation of a vegetation-based PRG, temporal variability has no bearing on the selection of a PRG based on potential risk but could be considered in the remedy monitoring approach.

SC-15 **Section 4, Page 8, Vegetation-Based PRG for Selenium, paragraph 2.** It is unclear why wild ungulates are grouped with livestock in the PRG discussion. Livestock and ungulates were evaluated separately and ungulates are not restricted to grazing allotments. Suggest removing ungulates from the livestock discussion.

Response: The requested change will be made.

SC-16 **Section 4, Page 8, Vegetation-Based PRG for Selenium, paragraph 3.** The proposed value of 50 mg/kg as stated in the document comes from the 2008 Merck veterinary manual where a toxicity reference value was derived to protect cattle, sheep, and pigs from acute exposures to selenium in plants or mis-mixed diets containing selenium concentrations above 50 mg/kg. The 2016 Merck veterinary manual suggests lower selenium dosages (0.2–0.5 mg/kg) to young

animals considered more susceptible to selenium acute intoxication from their parents (acute parental toxicosis).[7] Therefore, the 50 mg/kg threshold may not be protective of young animals.

Response: The values cited in the comment from the Merck manual for young animals are for parenteral pathways of exposure, which means pathways other than oral ingestion (e.g., intravenous or intramuscular injections). Consideration of parenteral pathways for selenium can be important for assessing toxicity (or efficacy) of veterinary drugs or supplements meant to improve the health of the animal. The primary pathway of concern for the Smoky site is ingestion of selenium in food; in particular ingestion of vegetation by animals.

SC-17 **Section 4.0, Page 8, Vegetation-Based PRG for Selenium, paragraph 3.** The 2004 DEQ area-wide risk management plan[8] recommends a selenium removal action level for impacted and reclaimed vegetation of 5 mg/kg dw for the protection of herbivores and mammals. This value has been considered as a "to be considered (TBC)" ARAR for the Ballard Mine[9] and can be considered as an ARAR for remedial activities at other mines in southeastern Idaho. The proposed acute PRG (50 mg/kg) is ten times higher than the removal action level, and the proposed chronic PRG (10 mg/kg) is two times higher than the removal action level. Therefore, the proposed PRGs are inconsistent with potential ARAR to be used at Smoky Canyon Mine.

Response: As described in the CERCLA guidance "TBCs are not potential ARARs because they are neither promulgated nor enforceable." (Overview of ARARs, December 1989, Publication 9234.2-03/FS). The area-wide risk management plan was correctly identified as TBC at the Ballard Mine and is also TBC for Smoky Canyon. The area-wide removal action objectives are superseded by the Site-specific investigation and risk assessment at Smoky Canyon.

[7] Merck Veterinary Manual. 2016. "Acute Selenium Toxicosis." Accessed August 14, 2017. https://www.merckvetmanual.com/toxicology/selenium-toxicosis/acute-selenium-toxicosis

[8] Idaho Department of Environmental Quality (DEQ). 2004. *Selenium Area Wide Investigation Southeast Idaho Phosphate Mining Resource Area*. Soda Springs, Idaho.

[9] MWH Americas, Inc. 2016. *Ballard Mine Feasibility Study Report memorandum 1 Site Background and Screening of Technologies.*

SC-18 **Section 4.1, Page 8, Estimating Prey Tissue Concentrations from Vegetation, paragraph 1.** Please provide a description in the text of the regression equations that were used for estimating prey tissue concentrations from vegetation.

Response: The description will be provided as requested.

SC-19 **Section 4.1, Page 9, Estimating Prey Tissue Concentrations from Vegetation, paragraph 1.** Please clarify the statement that "…mean vegetation selenium concentrations equal to the target concentrations shown in Table 4 are expected to be within the bounds of the 95% confidence limits of the linear regression models."

Response: The requested clarification will be provided in the revised document.

SC-20 **Section 4.3, Page 10, Hazard Quotient Calculation, paragraph 2.** Editorial – "USPEA" should be changed to read as "USEPA."

Response: The requested change will be made in the revised document.

SC-21 **Section 4.4, Page 12, Evaluating the Protectiveness of Vegetation-Based PRGs, paragraph 3.** The text "…, thus preventing uptake of selenium by vegetation" should be revised to "…, thus reducing uptake of selenium by vegetation" because selenium uptake is not prevented.

Response: The revision will be made as requested.

SC-22 **Section 4.5, Page 12, Testing the Predictive Ability of the PRG, paragraph 1.** Please provide clarification on why a subset of upland sampling locations that contained a geometric mean selenium concentration measured in terrestrial vegetation approximately equal to 10 mg/kg was selected from the full upland dataset.

Response: The evaluation was provided to test the predictive ability of the model using a real-world dataset that had concentrations in vegetation near the proposed PRG. The requested clarification will be provided in the revised document.

SC-23 **Section 4.5, Page 12, Testing the Predictive Ability of the PRG, paragraph 1.** Please clarify whether the data that were used to test the predictive ability of the model also were used in developing the model. By definition, regression techniques obtain model parameters that are optimal for a given set of data. In ordinary least squares regression, the model parameters are selected to minimize the sum of squared errors of prediction (residuals) and, conversely, maximize the amount of variance accounted for in the response variable (R-squared). Because the equation has been optimized for the given set of data, it won't perform as well with a new set of data. The regression model should be applied to a new set of data to provide a more accurate estimate of the operating characteristics of the model.

Response: A more detailed description of the statistical analysis will be provided in the revised document. However, please note that only simple linear regressions were used in the analysis and no ordinary least squares regressions were included. In addition, no optimization of the equation was conducted.

SC-24 **Table 1.** Why are averages used for small mammal comparisons, but not for other media?

Response: Average small mammal concentrations at each site were used because multiple samples were collected from each site. This will be clarified in the revised document.

SC-25 **Table 13.** The Northern harriers home range is significantly smaller than the disturbed areas at Smoky Canyon Mine. The Northern harrier was selected as a representative endpoint species for raptors, which may include others that have small home ranges (e.g., American kestrel). Considering this, what justification is there to support using a site use factor below 1 for these receptors?

Response: While the Site may provide habitat for one or several raptors, those individuals would use only a portion of the Site. The local sub-population of raptors will use an area much larger than the ODAs, and much larger than the Site. Because the Assessment Endpoint defined for the SSERA was based on populations, approximate area use factors were used.

Additional information regarding the potential for populations of Northern harriers to be exposed to elevated selenium concentrations at the Site will be provided in the revised technical memorandum. The home range for a single harrier was estimated at 642.5 acres in the Final SSERA. Based on data collected from southwestern Idaho (Martin 1987), average home ranges for female (1.13 km2;

280 acres) and male (15.7 km2; 3,880 acres) ranged widely and utilized a number of different habitats. Female birds used sage brush habitats (67.5%) much more heavily than male birds (17.7%) with male birds using riparian habitats (43.9%) more heavily. Neither male nor female birds heavily used abandoned field areas that most closely represent the uncovered ODAs; with male and female birds using those habitats only 11.5% and 1.4%, respectively. Nesting density is driven by prey abundance and nesting habitat. Harriers are ground nesters and prefer nesting in wet areas even in dry environments and do not generally nest in high densities unless prey abundance is high (Smith et al. 2011).

Because the ODAs are all smaller in area than the estimated home ranges and the habitat provided by the ODAs is not a preferred feeding ground, it is likely that individual birds may feed on the ODAs, but the food obtained from the ODAs makes up less than 100% of the individual bird's diet. The overall available habitat on the ODAs likely makes up a portion of several individual birds' habitats, but Site use by the local populations is likely to be limited relative to the large expanses of available higher quality habitat surrounding the Site even during breeding season.

SC-26 **Figure 1.** It is possible that the higher selenium concentrations found in vegetation at areas of low soil selenium concentrations are skewed by the presence of accumulator species in some samples. If forbs and grasses are evaluated independently, would the correlations be significantly stronger?

Response: There were no hyperaccumulators included in the RI forage samples. Alfalfa, an accumulator, was in many of the samples. As discussed in the response to SC-12, additional evaluation of the relationships between selenium concentrations in soil and in collocated grass and forb samples will be provided as appropriate in the revised document.

SC-27 **Figure A2-1 through A2-7.** Please provide a legend that defines the various intervals shown on the regression plots.

Response: The change will be made as requested.